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14. ABSTRACT

It is widely acknowledged that cardiovascular disease prevention requires intervention as early in the human lifespan as practical. A window of opportunity presents in early adulthood when students gain independence as young adults attending university. In a three-phase investigation, this study will evaluate the behavioral patterns of university students in the domains of diet, exercise, stress management, smoking and sleep (phase 1). Informed with information from phase 1, a pilot study (phase 2) will test the feasibility of performing an intervention in university students consisting of an 8-week period during which the students will receive up to six text messages (by phone or iPad) per week, tailored to address the behavioral issues that the student has identified as needing improvement and for which the student has indicated a desire to make change. Using lessons learned in phase 2, a randomized, controlled trial of the 8 week intervention (phase 3) will compare intervention subjects with controls for outcomes of behavior change, measures of anthropomorphic data, and serum markers of cardiovascular risk to test the impact of the intervention.

15. SUBJECT TERMS
Lifestyle, text messaging, nutrition, exercise, sleep and stress.

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I. **Introduction:**

This study addressed the issues of health behaviors in the domains of nutrition, exercise, stress, sleep and smoking. We intended to improve health behaviors in these domains by evaluating lifestyle choices, learning styles, and communication preferences with a three-phase investigation.

Phase I had the specific objective of lifestyle assessment. Phase 2 was a pilot study in a limited number of university students to determine the feasibility of the use of health coaching and electronic messages to promote behavior change. Phase 3 measured improvements in the lifestyle behaviors of students as a result of health coaching and electronic messages.

II. **Body:**

Please find below the summary of each phase of the research project:

Phase 1: March 2013 to October 2013- completed
The Seton Hill University Institutional Review Board (SHU IRB) and the Human Research Protection Office of the US Army Medical Research and Materiel Command approved the study protocol for human subject research. Due to a delay in approval and subsequent delay in starting SHUPEP, Phase 1 carried over into the fall semester. Subjects were recruited using various strategies such as classroom announcements, flyers, and booths located in student common areas on the university campus. Recruited subjects were screened for eligibility based on the following exclusion criteria: below age 18 and above age 30, pregnancy or suspected pregnancy, presence of a chronic medical condition, history of an eating disorder and taking prescribed medication other than oral contraceptives. A total of 205 individuals were screened eligible and enrolled during the study period, and a total of 180 participants completed the study. Written informed consent was obtained from eligible subjects prior to enrollment. One hundred fifty-eight participants completed Phase 1 in the spring semester (March-May), five over the summer months (May-August), and 17 completed in the fall semester (Sept- Oct). Cross-sectional data were collected on all participants over several visits to the research center.

Surveys: Subjects completed an electronic survey packet composed of seven validated questionnaires including Rate Your Plate (RYP) dietary assessment, International Physical Activity Questionnaire (IPAQ), Epworth Sleepiness Scale (ESS), Pittsburgh Sleep Quality Index (PSQI), visual analog Fatigue Scale, Berlin Sleep Questionnaires and Perceived Stress Scale (PSS 14). They also completed a demographic survey.
Body Composition: Percent of fat free mass and fat mass was measured using BODPOD® air displacement whole body volume densitometry on subjects wearing study provided swimsuits and caps. Bioelectrical impedance spectroscopy (Impedimed SFB7) was also used to capture body composition information by measuring fat-free mass, fat mass, and intracellular and extracellular fluid.
Anthropometrics/Vitals: Weight was measured using a calibrated scale (DS6100: Doran Remote Indicator Scale). Height was measured in centimeters on a wall-mounted stadiometer (HM210D Precision Model). Blood pressure was measured using a digital blood pressure monitor (HEM-907XL: Omron IntelliSense® Professional Digital Blood Pressure Monitor) after a five minute resting period.
Blood Collection: A certified phlebotomist collected blood samples from participants following 12 hour fasting period. Plasma (3 mL) and serum (9.5 mL) samples were collected for a lipid panel in vacutainers, separated by centrifuging at 4,150 rpm for five minutes at 22℃ using a Sorvall Legend Mach 1.6 centrifuge (Thermo Fisher Scientific Inc.), stored at 22 ℃ and analyzed for fasting glucose, fasting insulin, HgbA1C, low-density lipoprotein (LDL), high density lipoprotein (HDL), total cholesterol, triglycerides, and vitamin D.

Accelerometer Studies: Twenty-five percent of subjects wore an accelerometer Sensewear® armband (BodyMedia, Inc.) for five consecutive days including a weekend day. The armbands use accelerometer-based motion detection, galvanic skin response, skin temperature, and heat flux to capture subject's physical activity and sleep patterns.

Subjects were compensated for their participation in the amount of $50.
Lab values, body measurements, and blood pressure measurements were reviewed for comparison to exclusionary or critical standards. Subjects yielding exclusionary and critical values were released from the study, referred to the campus nurse, and encouraged to contact their primary care provider for further evaluation.

Phase 1 Results
T-tests or chi-square as appropriate was used to assess whether statistically significant differences existed on key pillar issues. The Bonferroni correction controlled for type-1 error. Specific results can be noted in poster session abstracts on Phase 1 that can be found in the Appendix of this report. All results of data analysis completed by SHUPEP statistician have been saved to a flash drive and delivered to ICHP

Phase 2: January 2014-May 2015- completed

A total of 39 subjects were screened eligible and enrolled and 34 participants completed the study. Phase 2 was a pilot goal setting/text-message intervention.

Phase 2 Data Collection and Intervention
A comprehensive health evaluation was performed on subjects both at baseline and following the 8-week intervention period. See Phase 1 for a description of data collected. Bioimpedance data were not collected on phase two participants. Following baseline data collection, results were aggregated into a comprehensive health assessment for subjects to compare their results to measurement standards and easily visualize potential areas of improvement. Lab values, body measurements, and blood pressure measurements were reviewed at baseline for comparison to exclusionary or critical standards. Subjects yielding exclusionary and critical values were released from the study, referred to the campus nurse, and encouraged to contact their primary care provider for further evaluation.

Intervention
Subjects were sent their health assessment to review in preparation for their meeting with American Council on Exercise (ACE) certified health coaches. During this meeting, subjects set a behavioral goal with recommendations from their health coach. The goal represented a tangible, actionable behavior that the subject could address to improve a health variable objective identified from the health assessment. The objective was identified in tandem with the goal to empirically capture improvements as a result of behavior change. The health variable objective target was calculated individually using baseline data.
The finalized goal served as the basis for the tailored informational, motivational, and action-oriented text messages aimed to encourage subject goal attainment. The health coaches disseminated intervention messages through a custom iOS application designed by ICHP that subjects downloaded to their university-issued iPad or their personal iPhone. Intervention messages were delivered on a regular schedule on Tuesdays and Thursdays at 9:00 AM and Saturdays at 11:00 AM for the study period of 8 weeks. Upon receipt of the messages subjects were asked to indicate whether the messages received were helpful. Subjects were also asked to complete weekly behavioral assessments (BA). The BA included brief questions addressing each pillar as well as their progress towards their goal. The coaches utilized BA feedback to customize text messages to address barriers impeding goal attainment.

Phase 2 Results

Review of Phase 2 data led to the development of a more structured format for goal statements.

Phase 3: January 2015-May 2015 - completed

A total of 84 subjects were screened eligible, and 77 enrolled for randomized: 38 Intervention and 39 Control. Fifty-nine subjects completed the study: 29 Intervention and 30 Control. Five participants were released per protocol, and 13 participants were lost due to attrition.

Phase 3 Data Collection and Intervention

A comprehensive health evaluation was performed on Control and Intervention subjects both at baseline and following the 8-week intervention period. See Phase 1 for a description of data collected. Bioelectrical impedance data were not collected during phase 3. Following baseline data collection, results were aggregated into a comprehensive health assessment for subjects to compare their results to measurement standards and easily visualize potential areas of improvement. Lab values, body measurements, and blood pressure measurements were reviewed at baseline for comparison to exclusionary or critical standards. Subjects yielding exclusionary and critical values were released from the study, referred to the campus nurse, and encouraged to contact their primary care provider for further evaluation.

Intervention

Subjects were sent their health assessment to review in preparation for their meeting with American Council on Exercise (ACE) certified health coaches. During this meeting, subjects set a behavioral goal with recommendations from their health coach. The goal represented a tangible, actionable behavior that the subject could address to improve a health variable objective identified from the health assessment. The objective was identified in tandem with the goal to empirically capture improvements as a result of behavior change. The health variable objective target was calculated individually using baseline data.

The finalized goal served as the basis for the tailored informational, motivational, and action-oriented text messages aimed to encourage subject goal attainment. The health coaches disseminated intervention messages through a custom iOS application that subjects downloaded to their university-issued iPad or their personal iPhone. Intervention messages were delivered on a regular schedule on Tuesdays and Thursdays at 9:00 AM and Saturdays at 11:00 AM for the study period of 8 weeks. Upon receipt of the messages subjects were asked to indicate whether the messages received were helpful. Subjects were also asked to complete weekly behavioral assessments (BA). The BA included brief questions addressing each pillar as well as their progress towards their goal. The coaches utilized BA feedback to customize text messages to address barriers impeding goal attainment.

Control subjects in Phase 3 also met with a member of the SHUPEP team to receive their individual health assessment but received no health coaching. The study protocol was registered on ClincialTrials.gov: 375278-3.

Phase 3 Results

Phase 3 was successfully conducted. At ICHP, we performed an independent analysis of the data to evaluate the impact of the tailored text-message intervention on self-selected health behavior goals in the domains of diet, exercise, stress and sleep. A second objective was to measure the ripple effect of the goal-oriented text messages on unselected health behaviors. Of 60 full-time students, age 18-30, at Seton Hill University, 30 were randomized to receive text messages and 30 were controls. In the intervention group, 22 of 30 (73%) showed improvement with a mean goal attainment of 87%. Intervention participants increased their exercise significantly compared to controls, irrespective of their goal category. The improvement of increased exercise was paralleled by significantly lower fasting glucose levels.

We concluded that the tailored text-message intervention improved selected health behaviors with a ripple effect to include unselected health behaviors in this population.

III. **Key Research Accomplishments:**

- Participated in conference calls with statistician and Seton Hill colleague to discuss direction of manuscript given that statistically significant differences were not found in objective attainment between control and intervention groups.
- Performed data analysis to provide information to complete poster presentations for accepted abstracts for Food and Nutrition Conference and Expo, Nashville TN October 2015.
- Created tables to place in posters for Food and Nutrition Conference and Expo, Nashville TN**.**
    - **Importance of Healthy Diet in Young Adults for Prevention of Cardiovascular Disease**
    - **Dietary Sodium or Fat Intake? Effects on blood Pressure in Young Adults**
- Collaborated with all SHUPEP team members to begin drafting first manuscript on outcomes data.
- Completed summary of ideas for a first manuscript and collaborated with Seton Hill staff for submission of manuscript summary to the American Journal of Health Promotion. Abstract of the potential submission was not accepted for further submission of full manuscript.
- Performed further data analysis of Phase 3 dataset in order to provide new directions for manuscript generation.
- Created tables for Phase 3 manuscript (See appendices)
- Participated in further revisions of manuscript for submission to another journal and provided opportunity for all team members and ICHP colleagues to review. Manuscript is nearing final form but is still undergoing collaborative revision.
- Downloaded and stored all study data and statistical analysis results from collaborating researchers at Seton Hill University.

See Appendices A.

IV. **Reportable Outcomes:**

The titles of the four abstracts submitted to the American College Health Association for poster session consideration for the May 2014 meeting are shown below. Complete abstracts can be found in the Appendices.

Associations between Anthropometric Measures of College Students and Campus Dining Options

Sleep Quality, not Sleep Quantity, Correlates with Academic Performance

Vegetarian-style Eating in College Students: Diet Survey Analysis and BMI

Vitamin D Deficiency in College Students: Prevalence and Implications

The Academy of Nutrition and Dietetics accepted two abstracts on Phase 1 data for poster session consideration for the 2015 Food and Nutrition Conference and Exhibition. Poster titles are shown below; complete abstracts can be found in the Appendices.

Importance of Healthy Diet in Young Adults for Prevention of Cardiovascular Disease

Dietary Sodium or Fat Intake? Effects on blood Pressure in Young Adults

Final manuscript is in preparation.

See Appendices B.

V. **Conclusions:**

Manuscript development is ongoing. The finding that is most beneficial for the future is that tailored, informational, motivational, and action-oriented text messages facilitated progress toward goal attainment in an eight week intervention. Further studies could determine if longer interventions could impact not only goal attainment but also objective attainment. If so, electronic messaging could be used as one strategy to improve the health behaviors of deployed service personnel.

VI: **References:**

Sandrick J, Tracy D, Eliasson A, Roth A, Bartel J, Simko M, Bowman T, Harouse-Bell K, Kashani M, Vernalis M. Benefits of a text-messaging intervention on self-selected health behaviors in college students. *J Am Coll Health*. Submitted for publication 29 Nov 2015.

Journal of American College Health Manuscript ID JACH-2015-11-0410

VII: **Appendices:**

Appendix A: Abstracts

Appendix B: Table

VIII: **Attachment: List of Paid Personnel**

Appendix A: Abstracts

Abstracts submitted to the American College Health Association for poster session consideration at the May 2014 meeting can be found below.

Associations between Anthropometric Measures of College Students and Campus Dining Options

Bowman, T., Sandrick, J., Tracy, D., Roth, A., Harouse-Bell, K., Kashani, M., Vernalis, M., Eliasson, A.

Purpose: The purpose of this poster session is to understand the impact of various campus-dining options on body fat, BMI and weight among college students.
Abstract: University students (n=161; female 72.6%, Caucasian 82%, mean age 19.8yr) were surveyed for meal plans and measured for percent body fat (%BF) and body mass index (BMI). Students with on-campus meal plans had similar %BF (p=0.84) and BMI (p=0.90) compared to students with no meal plans. However, BMI (25 vs 24kg/m^2, p=0.04). Flexible spending not specific dining plans, is associated with increased weight.
Practice Gap: Overweight and obesity are pandemics that include college-aged students. Students commonly struggle with increased percent body fat and high BMIs despite a personal desire to achieve fitness. Universities are responding to the problem of overweight by offering more diverse dining plan options that ever before. However, the impact of these various campus dining options is not well understood. There is a lack of data about campus dining choices and maintenance of a healthy weight.

Sleep Quality, not Sleep Quantity, Correlates with Academic Performance

Sandrick, J., Eliasson, A., Tracy, D., Harouse-Bell, K., Bowman, T., Roth, A., Kashani, M., & Vernalis, M.

Purpose: The purpose of this activity is to provide college health professionals with information to allow more useful and accurate guidance to college students who are experiencing daytime fatigue and poor academic performance.
Abstract: Sleep is essential for learning. However, little evidence validates this theory outside laboratory settings. University students (n=157; female 72%, Caucasian 82%, mean age 20.0$\pm$ 1.9yrs) showed no difference in total sleep time between students with GPA$\geq$ median and those < median (p=0.34). However, high-GPA students reported better sleep quality (p=0.001), shorter sleep latency (p=0.035), less early AM awakening (p=0.029) and less daytime fatigue (p=0.001). Parameters of sleep quality correlate more strongly with academic performance than total sleep time.
Practice Gap: In their role to promote student health and improve student performance, college health practitioners and student counselors would benefit from the knowledge that sleep quantity (total sleep time) is not the primary foal to improve sleep behaviors among college students. These health professionals should emphasize improving sleep quality with the aim of decreasing time to fall asleep and resolving the symptom of daytime fatigue.

Vegetarian-style Eating in College Students: Diet Survey Analysis and BMI

Harouse-Bell, K., Sandrick, J., Tracy, D., Bowman, T., Roth, A., Kashani, M., Vernalis, M., & Eliasson, A.

Purpose: The purpose of this poster session is to illuminate the early benefits of vegetarian style eating in a subsample of college students.
Abstract: In a health assessment, university students (n=161, mean age 19>8yrs) completed Rate-Your-Plate (RYP) questionnaires. Compared to meat-eaters (n=86), vegetarian-style-eaters (n=20) had healthier RYP scores (68.7$\pm$5.5 vs 54.6$\pm$6.5, p=0.003) and lower BMI (22.2$\pm$3.4 vs 24.8$\pm$4.1 kg/m^2. P=0.01). These

differences were not due to eating behaviors such as portion control (p=0.46), skipped meals (p=0.19), or stress eating (p=0.39). These results extend prior findings to a younger age than previously described, supporting initiatives for health promotion in college-aged adults.
Practice Gap: Improved health is one of the many reasons people choose to adopt a vegetarian-style diet. Research has found many health benefits with this type of diet. A vegetarian diet started earlier in life might avert significant risks to health and may be positively associated with the development of certain chronic diseases. Vegetarian style diet choices are usually limited in the collegiate setting, but could be incorporated into more dining options and health education in this population given the benefits documented.

Vitamin D Deficiency in College Students: Prevalence and Implications
Roth, A., Sandrick, J., Tracy, D., Bowman, T., Harouse-Bell, K., Kashani, M., Vernalis, M., & Eliasson, A.

Purpose: The purpose of this poster session is to illuminate the alarming rates of Vitamin D deficiency in a subsample of college students and discuss the factors associated with deficiency.
Abstract: A health assessment of university students (n=161; female 72.6%; Caucasian 82%; mean age 19.8) was conducted in spring. Laboratory tests including 25-hydroxyvitamin (25-OH) D levels were obtained. Participants completed Rate Your Plate (RYP) survey, which scores dietary quality based on frequency of consumption of 27 food categories. 73.2% of participants had Vitamin D (25-OH) deficiency (20 ng/mL). Participants with normal Vitamin D levels had a more healthful diet by RYP score, compared to those with insufficiency ($p<0.05$).
Practice Gap: Vitamin D deficiency has garnered attention from researchers given the substantial rates of prevalence, especially in geographic regions with less sun exposure and with minority populations. Vitamin D deficiency poses significant risks to health and may be negatively associated with the development of certain chronic diseases. Vitamin D is not commonly tested in the collegiate setting but could be incorporated into health assessments given the severity of prevalence documented.

The two abstracts accepted by the Academy of Nutrition and Dietetics for presentation as poster sessions at the 2015 Food and Nutrition Conference and Exhibition can be found below.

Importance of Healthy Diet in Young Adults for Prevention of Cardiovascular Disease

Sandrick, J., Eliasson, A., Tracy, D., Roth, A., Bowman, T., Harouse-Bell, K., Kashani, M., Vernalis, M.

Abstract Background: Diet is a key intervention to prevent cardiovascular disease (CVD) in middle-aged and older adults. Dietary goals include decreasing saturated fat, eating modest amounts of protein from lean sources, eating less refined carbohydrates and increasing fiber via fruits and vegetables. We hypothesized that college-aged adults adhering to these diet principles would show healthier cardiovascular profiles than young adults who did not.
Methods: In a cross-sectional study, student volunteers completed validated questionnaires for diet (Rate-Your-Plate or RYP), exercise, perceived stress and sleep. Anthropometric measures, blood pressure, and cardiac-relevant laboratory tests were also performed. Students scoring in the RYP healthy range were compared to those in the low and intermediate ranges using t-test or chi-square as appropriate. The Bonferroni correction controlled for type-1 error.
Results: Of 180 students, mean age $\pm$ SD 19.8 $\pm$ 1.8 years, 132 women (73%), there were 145 Whites (81%), 22 Blacks (12%), 13 other (7%). Students with healthy RYP scores ate more whole grains (p=0.006), more fruits and vegetables (p=0.001), more low-fat choices ($p<0.001$), and less salty choices (p=0.002). These students also had lower BMIs (23.5 ± 3.7 vs. 24.8 ± 4.2 kg/m^2, p=0.03), lower blood pressure (118/74 vs. 123/78

mmHg, p=0.004), and higher HDL cholesterol (56.6±14.6 vs. 51.6±12.6 mg/dl, p=0.02). Exercise time (p=0.20), perceived stress (p=0.31), and sleep time (p=0.22) were similar between groups.
Conclusion: Diet plays an important role in CVD risk, independent of exercise, stress, and sleep. These findings suggest the importance of healthful food choices even in young adults for prevention of CVD.

Dietary Sodium or Fat Intake? Effects on Blood Pressure in Young Adults

Tracy, D., Eliasson, A., Sandrick, J., Roth, A., Bowman, T., Harouse-Bell, K., Kashani, M., Vernalis, M.

Abstract Background: Dietary sodium intake as a cause of hypertension remains controversial. We examined the impact of diet on blood pressure (BP) in college-aged adults, hypothesizing that increased dietary sodium intake would correlate with elevations in BP.
Methods: In a cross-sectional study, students completed validated questionnaires for diet (Rate-Your-Plate or RYP), exercise, perceived stress and sleep. Students also had measures of blood pressure and body mass index (BMI). Students with BP≤120/80 (normotensive) were compared to those with BP>120/80 but less than 140/90 (pre-hypertensive) using t-test or chi-square as appropriate. The Bonferroni correction for multiple comparisons required p<0.0031 to reach statistical significance.
Results: Of 180 students, ten with hypertension were excluded from analysis. Students were taking no vasoactive medications. Normotensives (n=84) were similar to pre-hypertensives (n=86) for mean age±SD (19.5±1.2 vs. 20.1±2.2 years, p=0.03), race (p=0.58), exercise (p=0.27), perceived stress (p=0.05), and sleep time (p=0.22). Normotensives were most likely women (94% vs. 59% women, p<0.0001) and had lower BMI (23.0 vs. 24.8 kg/m^2, p=0.003). Groups were similar for six RYP factors suggesting high dietary salt: eating out (p=0.014), cold cuts/breakfast meats (p=0.43), cheese (p=0.17), added salt (p=0.07), canned food/packaged meals (p=0.79), and salty snacks (p=0.78). Normotensives had lower fat intake by four RYP factors including high fat intake: red meat frequency, p=0.0002; red meat choices, p=0.004; poultry with skin, p=0.008; dressing choices, p=0.003.

Appendix B:

Table 1. Subject Goals with Intervention Messages

	Nutrition	Exercise	Sleep	Stress
Goal	Increase fruit and vegetable intake from 2/day to 5/day.	Increase exercise from 0 to 3x/week for 20 minutes (60 total minutes/week).	Expand total sleep time from 6 to 7 hours/night. Make bedtime 11:00 PM instead of 12:00 AM.	Manage stress by making a "to-do" list 5 days/ week instead of 0 days/week.
Example Messages				
Action-oriented	Try to add three servings of fruit to your day, a handful of grapes, a crisp apple, etc. Natural fruit is a great source of fiber, provides fullness and sweetness.	Try this workout: 5 minutes of a light jog, 1 minute of sprinting followed by 1 minute of low speed jogging, repeat 5 times. Jog for 5 minutes as your cool down.	Budget time for sleep just as you budget time for other activities. Include a “power-down” period of 20 or 30 minutes to allow yourself to get ready for sleep. Set a reminder alarm that it is time to get ready for bed.	Try to organize for 15 minutes each day. This could mean anything from sorting mail to throwing out mystery foods in the refrigerator. Just 15 minutes a day can make a huge difference over time!
Motivational	Good job with your fruits and veggies! Looks like you've improved!	No matter how slow you go. You are still lapping everyone on the couch.	Perform at your highest potential. Sleep prepares your mind and body for the next day’s endeavors.	Make each day count. Focus on today and do things that really matter!
Informational	Fruits and vegetables are naturally low in salt. Focus on eating more fresh food like fruits and vegetables and less processed foods.	Exercise releases endorphins which create feelings of happiness and euphoria.	Did you know? Watching television before bedtime can actually stimulate the mind rather than relax it. Listening to audiobooks or music may be a better choice.	I heard the App "Simplenotes" is a good one for your iPhone for organization and it's free.....you should look into it!

Table 2. Demographic Information

	All Subjects (n=60)	Control (n=30)	Intervention (n=30)	p value*
Age (years)	19.4 ± 1.0	19.3 ± 0.9	19.5 ± 1.1	0.38
Sex (n,% women)	41, 68%	20, 67%	21, 70%	0.79
Race	52W, 5B, 2H, 1A	24W, 4B, 1H, 1A	28W, 1B, 1H	0.38
Grade Point Average	3.5 ± 0.4	3.5 ± 0.4	3.6 ± 0.3	0.16
Year of Study	26F, 18S, 9J, 7S	12F, 11S, 5J, 2S	14F, 7S, 4J, 5S	0.49
On/Off Campus Residence	48/12	24/6	24/6	1.00
Active in Varsity Sport	27	16	11	0.42

*p value signifies level of statistically significant differences by t-test between control and intervention subjects
W = white, B = black, H = Hispanic, A = Asian
F = freshman, S = sophomore, J = junior, S = senior

Table 3. Lifestyle behaviors, symptoms, and laboratory data at program beginning and program completion.

	Program Baseline				Program Completion			
	All Subjects (n=60)	Control (n=30)	Intervention (n=30)	p value*	All Subjects (n=60)	Control (n=30)	Intervention (n=30)	p value*
Diet (RYP)	61.4 ± 7.8	61.5 ± 7.7	61.3 ± 8.1	0.91	63.0 ± 8.9	62.7 ± 8.3	63.6 ± 9.6	0.81
Exercise (IPAQ)	2416 ± 2508	2208 ± 2106	2632 ± 2889	0.52	2590 ± 1965	2074 ± 1410	3144 ± 2324	0.037
Stress (PSS-14)	23.1 ± 8.0	23.1 ± 8.9	23.0 ± 7.0	0.99	23.9 ± 8.7	23.8 ± 9.3	24.0 ± 8.1	0.94
Sleep (PSQI)	5.2 ± 2.7	5.3 ± 2.3	5.1 ± 3.0	0.81	5.5 ± 3.0	5.9 ± 3.2	5.2 ± 2.9	0.37
Sleepiness (ESS)	7.8 ± 3.8	8.1 ± 4.3	7.5 ± 3.2	0.55	8.5 ± 4.0	8.8 ± 3.8	8.3 ± 4.2	0.63
Fatigue (SFS)	4.1 ± 2.0	3.7 ± 2.2	4.4 ± 1.9	0.21	4.6 ± 2.0	4.3 ± 2.0	4.9 ± 2.0	0.25
Fasting Glucose	78.8 ± 6.4	79.0 ± 6.7	78.6 ± 6.3	0.83	76.1 ± 8.4	78.2 ± 8.2	74.0 ± 8.3	0.05
Fasting Cholesterol	159.4 ± 30.1	157.1 ± 28.5	161.7 ± 32.0	0.56	159.7 ± 29.1	160.5 ± 29.3	158.9 ± 29.4	0.83

*p value signifies level of statistically significant differences by t-test between control and intervention subjects at program baseline or at program completion
RYP = Rate Your Plate Dietary Questionnaire, of 81 total possible points, higher score indicates a healthier diet.
IPAQ = International Physical Activity Questionnaire in MET-minutes per week, higher score equates with greater activity level.
PSS-14 = Perceived Stress Scale, of 56 total possible points, higher score indicates greater level of perceived stress.
PSQI = Pittsburgh Sleep Quality Index, of 21 possible points, lower score indicates better sleep quality.
ESS = Epworth Sleepiness Scale, of 24 possible points, higher score indicates greater daytime sleepiness.
SFS = Stanford Fatigue Scale, of 10 possible points, higher score indicates greater severity of fatigue symptom.

Conclusion:

Independent of exercise, stress, and sleep, high fat dietary choices but not dietary sodium was significantly associated with pre-hypertension.

List of Paid Personnel at HJF

Last Name	First Name	Role on the Project
Vernalis	Marina	PI
Eliasson	Arn	Clinical/Research Physician Consultant
Kashani	Mariam	Chief, Scientific Director
Nixon	Audra	Chief, Operations
Williams	Kenneth	Sr. Financial Analyst
Lampkin	Bettina	Financial Analyst

List of Paid Personnel at Seton Hill

Last Name	First Name	Role on the Project
Sandrick	Janice	Site Principal Investigator
Tracy	Doreen	Site Co-Principal Investigator
Yochum	Susan	Project Administrator
Roth	Ashley Holmes	Clinical Research Coordinator
Simko	Melanie	Interim Research Coordinator
Bowman	Tracy	Health Coach
Harouse-Bell	Karen	Health Coach
Zemba	Jennifer	Secretarial/Clerical
Bartel	Jeffrey	Statistician
Martin	Quinto	Instructional Designer
Hansen	Maura	Research Assistant
Clark	Andrea	Student SHUPEP Research Assistant
Bauer	Melissa	Student SHUPEP Research Assistant
Hassey	Emily	Student SHUPEP Research Assistant
Mixon	Sydney	Student SHUPEP Research Assistant
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